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Optimization and Harmonization of Radiation Monitoring at Nuclear Facilities Through ISO 14001 Compliance

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LLNL and ISO

Lawrence Livermore National Laboratory (LLNL) is a US Department of Energy (DOE) facility managed by the Regents of the University of California. DOE recently committed to implementing formal Environmental Management Systems (EMS) at each of its facilities to reduce the amount of waste produced and the amount of contaminants released into the environment. The goal is to have an EMS in place at all major DOE facilities by the end of 2005. DOE draft guidance focuses on ISO 14001 as a basis for an evaluation the adequacy of an EMS. This choice was made on the basis of the widespread use of the ISO EMS standard in both private and government facilities.

LLNL plays a critical role in protecting national security, both as a nuclear facility and as a provider of science and technology. LLNL's existing environmental management program was recently reviewed to understand what actions would be necessary for formal ISO 14001 compliance. As LLNL uses an Integrated Safety Management System which already incorporates many components of the ISO system, a "gap" analysis was conducted to understand what we need to do to achieve ISO 14001 compliance. The analysis, which focused on the adequacy and completeness of the current system and processes, found that the requisite elements of an EMS system are present but a number of improvements would need to be made in order to achieve ISO certification.

What is ISO?

ISO 14001 is a series of international, voluntary environmental management standards that provide a common framework for organizations to control the impact of their activities, products or services on the environment. "ISO" is the International Organization for Standardization, headquartered in Geneva Switzerland. ISO 14001 is a spin-off of the more widely known ISO 9000, which is a system for verifying or validating an organization's quality management system by

a third party. ISO 9000 was reorganized in 2000 to be more compatible with ISO 14001. The two standards are parallel in many respects and share about 70 % of their requirements in common.

The ISO 14001 standard is used to develop an EMS that will identify the aspects of operations that can impact the environment, and prioritize those impacts to determine which are significant. EMS's are used to control and manage those aspects to prevent or mitigate the impacts. Because of the emphasis on community involvement, the criteria for significance includes both actual and perceived impacts of an organization's operations. For example, because of concerns on the part of some members of the surrounding community and generalized heightened public sensitivity associated with any level of radioactivity, the presence of radioactivity in any environmental media (air, water, waste and soil) is given high priority at LLNL. This high priority is assigned despite the fact that our rigorous monitoring program annually shows that radiological impacts from our operations are minimal and pose no threat to the public or the environment. Nevertheless, it is especially important to have clear guidance and clear requirements with respect to radiological monitoring in order to adequately address institutional and community concerns.

The emphasis on continuous improvement in environmental protection requires continuous evaluation of opportunities to increase regulatory compliance and reduce pollution. ISO 14001 is about process and systems, not actual compliance or clean up and is generic rather than absolute. ISO 14001 applies equally to products or services and can be used by any kind of organization including businesses, or government entities. The common framework for managing environmental issues harmonizes national rules, labels and methods, which can be barriers to international collaboration.

These Environmental Management System (EMS) registrations occur in every populated region of the world. Environmental credibility is becoming an important factor in international competitiveness. As with its predecessor, ISO 9000, registration with ISO 14001 will increasingly become a requirement for international business.

Unlike most ISO standards which are developed by smaller groups of technical experts from interested nations, development of the ISO 14001 standard included much broader participation from countries all over the world.

Regulatory Compliance

A successful EMS will serve as the foundation for all subsequent environmental compliance activities. ISO 14001 emphasizes a voluntary and cooperative approach to regulatory compliance. Recent trends in environmental regulations are toward an ever-increasing number of requirements each year with increasing complexity. LLNL itself is regulated by multiple state, local and federal

agencies that enforce hundreds of regulations, many of them designed to ensure radiological safety. Managing the vast amount of information to assure compliance with the myriad of federal, state and local regulations continues to demand an increasing amount of organizational resources. The time that is required to comply with the administrative burden of enforcement actions takes away from resources that could be better spent protecting the environment. Because ISO 14001 requires a defined and established framework of regulatory requirements, it provides for a systematic approach to compliance. Mistakes resulting in noncompliance can be costly from both an economic and public relations standpoint. A systems approach to managing environmental requirements can help avoid noncompliance through oversight, neglect, or other mistakes that could result in substantial fines, litigation and decreased public confidence.

The requirement to show continuous improvement in environmental impact should continuously promote efficiencies, improve operations and reduce costs associated with pollution and enforcement actions.

What Are the Requirements of ISO 14001?

ISO 14001 describes 5 major elements of an EMS:

Environmental Policy

The standard requires that the environmental policy:

- A. is appropriate to the nature, scale and impacts of the organizations' environmental activities,
- B. includes a commitment to continual improvement and prevention to pollution,
- C. complies with legislation and industry group standards,
- D. provides a framework for setting and reviewing objectives and targets,
- E. must be documented, implemented, maintained and communicated, and
- F. must be available to the public.

Planning

Within the management requirement of planning there are four activities that should take place:

- A. Identification of the significant environmental impacts of the organization's activities. This will provide the fundamental framework, for use by managers and stakeholders, of those environmental matters that the organization considers important to operations.
- B. Identification of legal and other requirements which govern the organization.
- C. Establishment of achievable objectives and measurable targets for minimizing impacts and obtaining compliance with legal and other requirements.

- D. Establishment of environmental management program with specific responsibilities and time frames.

Implementation and Operation

Within the management requirement of implementation and operation there are seven activities that should take place:

- A. Definition of responsibilities. Documentation and communication of these responsibilities and assurance that resources are made available to personnel.
- B. Identification of training requirements to increase environmental awareness on the part of employees. Development of methods to ensure workers are competent to perform their assignments. Maintenance of documentation of training activities.
- C. Development of mechanisms for internal and external communication.
- D. Documentation of the elements of the Environmental Management System.
- E. Establishment and maintenance of procedures for EMS document control so that they can be located, reviewed and updated in a controlled manner.
- F. Identification of those activities associated with significant environmental aspects and the operational controls on them. These are commonly referred to as Standard Operating Procedures.
- G. Establishment of an emergency preparedness and response plan to respond to, prevent and mitigate environmental impacts while responding properly to emergencies, and procedures for monitoring and measuring operations that can have a significant impact on the environment.

Checking and Corrective Action

Within the management requirement of checking and corrective action, there are four activities that should take place:

- A. Identification of monitoring and measurement activities and operations. Monitoring equipment should be calibrated and a system of retaining records established.
- B. Establishment of procedures for handling and reporting nonconformance and corrective or preventative action.
- C. Maintenance of records for monitoring, training, audits, inspections and other records called for by the system.
- D. Development of an audit system for the environmental management system. Audits must be regularly performed to ensure that it is operating as intended.

Management Review

Finally, management must periodically review the environmental management system to ensure that the system is operating according to the ISO 14001 standards. Once the EMS is in place, a self-declaration protocol is completed or third-party verification is obtained. This presents the opportunity for changes to policy, objectives or other elements of the system.

Registration

An organization can achieve conformance with ISO 14001 either through self-declaration or through third-party registration. (The terms registration and certification are the same). The majority of organizations choose registration because of the greater level of credibility associated with third party verification. In order to be registered, a written application is submitted to the registration body. Outside auditors perform a full assessment and determine approval, conditional approval or disapproval. The auditing bodies themselves are typically evaluated and audited by a national accreditation body. Ongoing activities are then required to maintain the registration. These include monitoring and measuring the EMS, investigating and handling non-conformances, implementing corrective actions, and maintaining records.

As an alternative to registration, "self-declaration" of conformity with ISO 14001 standards is an approved and officially sanctioned (by the ISO system) option. Self-declaration is generally used by small to medium organizations and government agencies, which do not have the resources for registration, and is also used as an interim step towards registration. An organization can use one or more recognized evaluation guides in conducting audits to ensure that the self-declaration process has credibility. Lawrence Livermore National Laboratory plans to follow the self-declaration protocol and will reevaluate the necessity of registration at a later date.

Who's Using ISO 14001?

Worldwide there are over 61,287 organizations registered in over 118 countries. As the number of ISO 14001 registrations continue to grow worldwide, international customers will increasingly demand recognized EMS certification. However, some regions of the world have been quicker to adopt the standard than others. Organizations in Europe and Asia have been the most aggressive in pursuing ISO 14001 registration so far, although there are registrations on every continent except Antarctica.

The Darlington nuclear power plant in Canada made history as the first nuclear power plant to attain ISO 14001 registration in North America. Because public and employee safety is the most

important consideration in operating a nuclear facility, numerous other countries have nuclear power facilities with ISO 14001 EMS systems including the United States, France, Belgium, the Republic of Korea, India, the Czech Republic, Finland, and Kazakhstan.

Conclusion

The use of ISO 14001 represents an organized, flexible, and internationally recognized method for planning and implementing environmental management systems for a variety of enterprises. Environmental radioactivity exposure resulting from nuclear power plant operations can be a serious concern both locally, to the surrounding community and regulatory bodies, as well as globally. The benefits of an ISO 14001 compliant EMS system are particularly important with respect to these concerns, because the internationally recognized method provides assurances that environmental radiological safety issues are addressed. In addition, use of the system can improve actual environmental protection performance, cost effectiveness, and ensure continuous improvement. LLNL has shown that such a system can be successfully applied to a radiological research institution and many nuclear power plants around the world have done the same. Owners and operators of other nuclear power plants would be well served to consider using such a standard at their facilities.